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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,714	12/16/2003	Venkatesan Shanmugam	60497.000016	3454

21967 7590 02/09/2007  
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EXAMINER

ALLISON, ANDRAE S

ART UNIT PAPER NUMBER

2624

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	Application No. 10/735,714	Applicant(s) SHANMUGAM ET AL.	
	Examiner Andrae S. Allison	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on December 16, 2003.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 March 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/15/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "System and Method for Producing a Combined X-Ray CT and PET Tomograph".

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7 and 9-17 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Townsend (US Patent No.: 6,490,476) in view of Hamill et al (Pub No.: US 2003/0190065).

As to claim independent claim 1, Townsend discloses a method for executing a scanning procedure (column 1, lines 15-25) comprising the steps of: (a) generating CT image data for a scan (column 13, lines 5-7); (b) generating CT attenuation correction data for the scan (column 13, lines 24-25); (c) acquiring a current frame of PET data for

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the scan in a 3D format (column 13, lines 7-9); and (d) simultaneously conducting the following steps: reconstructing at least a portion of a PET image for the current frame, including the step of overlapping a portion of the current frame with an adjacent frame, and acquiring at least a portion of a next frame of PET data (note that the PET images are acquired over a 20 minute period, see [0080], lines 4-5).

Townsend teaches reconstructing the PET image, however does not specifically teaches reconstructing at least a portion of a PET image for the current frame, including the step of overlapping a portion of the current frame with an adjacent frame. Hamill discloses a medical image reconstruction method ([p][0004], lines 1-3) that includes reconstructing at least a portion of a PET image for the current frame, including the step of overlapping a portion of the current frame with an adjacent frame (see [p][0080], lines 1-19, where PET images are acquired with a 30 cm overlap between two bed positions).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have substituted the image reconstruction method of Townsend with the medical image reconstruction method of Hamill to acquired 3D PET tomography of a subject, correct the 3D emission sinograms for scatter and attenuation and applied Fourier recombining for reconstruction a 3D PET tomography of the subject ([p][0080], lines 1-19) which is of good quality in a short period of time ([p][0041], lines 16-18).

As to claim independent claim 11, this claim differs from claim 1 only in that claim 11 is system whereas, claim 1 is method and the limitations memory and processor are additively recited. Townsend discloses a system comprising: a CT detector (12, see Fig

2a); a PET detector (14, see Fig 2a); however does not expressly disclose the system comprising: at least one memory; and at least one processor. Hamill discloses a system (see Fig 1) comprising: at least one memory (e.g. 14 A, see Fig 1); and at least one processor (e.g. 12, see Fig 1). Thus combining the teachings of Townsend and Hamill would meet the claim limitations for the same reasons as discussed with respect to claim 1 above.

As to claim 2, note the discussion above, Hamill teaches the method, further comprising repeating step (d) for at least one subsequent frame (note that the PET images are acquired over a 20 minute period, see [0080], lines 4-5).

As to claim 3, Townsend teaches the method, wherein the 3D format comprises a projection plane format (column 15, lines 19-22).

As to claim 4, Townsend teaches the method of claim 3, wherein the step of reconstructing at least a portion of a PET image comprises applying a Fourier rebinning (column 13, lines 29-34) process to directly convert the PET data from the projection plane format to a sinogram format (column 13, lines 45-56).

As to claim 5, note the discussion above, Hamill teaches the method wherein the step of overlapping comprises computing a weight for each overlapping slice in the overlapping portion of the current frame and the adjacent frame (see [p][0046] and

[p][0047], where a projection weight is determined).

As to claim 6, note the discussion above, Hamill teaches the method, wherein the adjacent frame comprises a previous frame, and the step of overlapping comprises retrieving a stored overlapping portion of the previous frame ([p][0080], lines 13-18).

As to claim 7, note the discussion above, Hamill teaches the method, further comprising the step of storing an overlapping portion of the current frame to enable overlapping during reconstruction of the next frame (see [p][0044], lines 11-14, where input and output data is stored in memory).

As to claim 9, Townsend teaches the method, further comprising the step of generating a fused PET-CT image (e.g. see Fig 10 C) with the CT image data and the PET image.

As to claim 10, Townsend teaches the method, wherein the reconstructing step includes applying an attenuation correction to the PET image using the CT attenuation correction data (column 13, lines 29-31).

Claims 12-20 are differ from claims 2-10 only in that claims 12-20 are a method claim whereas, claims 12-20 are system claims. Thus, claims 12-20 are analyzed as previously discussed with respect to claim 2-10 above.

3. Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Townsend (US Patent No.: 6,490,476) in view of Hamill et al (Pub No.: US 2003/0190065) further Koritzinsky et al (US Patent No.: 6,272,469).

As to claim 8, Neither Townsend or Koritzinsky disclose the method, further comprising the step of automatically configuring a scan protocol for the PET data based on a scan protocol used to acquire the image CT data. Koritzinsky discloses a method for executing protocol (column 1, lines 5-7) that includes the step of automatically configuring a scan protocol for the PET data based on a scan protocol used to acquire the image CT data (see column 2, lines 59-61, where the protocol is automatically selected).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have added the method for executing protocol of Koritzinsky to the combined PET and X-Ray CT tomography method of Townsend as modified by Hamill to automatically select a protocol for linking several scanners in a radiology department of a medial institution (column 2, lines 45-62).

Claim 18 is differ from claims 8 only in that claim 8 is a method claim whereas, claim 18 is system claim. Thus, claim 8 is analyzed as previously discussed with respect to claim 18 above.

### ***Conclusion***

The prior art made part of the record and not relied upon is considered pertinent to applicant's disclosure.

Newport et al (Pub No.: US 2003/0161521) is cited to teach an apparatus and method for three dimensional image reconstruction.

Wollenweber et al (Pub No.: US 2004/0167387) is cited to teach a method for retrospectively correcting data prior to image reconstruction.

Townsend et al (Pub No.: US 2004/0030246) is cited to teach a combined PET and X-Ray CT tomography.

Natanzon et al (US Patent No.: 6,937,750) is cited to teach a method of registering a plurality of functional image.

### ***Inquires***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrae S. Allison whose telephone number is (571) 270-1052. The examiner can normally be reached on Monday-Friday, 8:00 am - 5:00 pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571) 272-7695. The fax phone



number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrae Allison

February 1, 2007

A.A.



JOSEPH MANCUSO  
SENIOR PATENT EXAMINER